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ROBOTICS & HOSPITALITY INDUSTRY - A STUDY OF INDIA'S FIRST ROBOTIC RESTAURANT "ROBO CHEF"

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Abstract

With the development of technology, the development of robot and robotic technologies has begun to be used in the hospitality industry. In light of these developments, the study was conducted on first robot-based restaurant in India, the Robo chef restaurant as a typical case sample and analysed 328 visitor reviews about the restaurant on Indian Food Freak website and OpenTable web sites. As a result of these analysis, three themes (robots and robotics performance, visitor emotions and experiences, and price performance) were determined by using thematic analysis method and making use of the literature. It aims to contribute to the discussions about the visitor comments and complaints about the use of robot and robotic technologies in the hospitality industry and the use of these technologies in hospitality. Analysis of the emotions and experiences of visitors stated that robots and robotics were met with fun, strange and interesting, but at the same time, visitors were disappointed with the performance of robots and robotics, and robots and robotics provided services below their expectations. As a result of the analyses made on the price performance of the Robo chef robot restaurant, it was not clear whether the restaurant prices were appropriate or not.

Keywords: *Robotic Restaurant, Service, Visitor Experiences, Hotel Industry*

Introduction

Globalised, changing and constantly evolving in human life, taking the development process continues. Along with this development and change, technology has also shown great developments in the last 20 years. However, technology has also changed the way of life and communication of individuals (Deb, 2014). At the beginning of these technologies, robotics, artificial intelligence and space technologies have shown significant and great developments. Robotic technologies have proven their effectiveness primarily by finding a place for itself in the service industry. This technology advent and use of space for years in the increase demonstrated reach in many industries and sub-sectors by finding a place for itself with different types effectively began the research. Along with these developments, different topics of discussion have also emerged. Robotics and artificial intelligence technologies enabled an element whereas in other hand these technologies will create unemployment (Revathi & Aithal, 2019).

If we look at robotic technologies from the perspective of the hospitality industry, we can say that these technologies are used especially in countries which are advanced in technology (e.g., Japan). Robotic technologies are using actively in multiple sub-sectors of the hospitality industry such as accommodation, food and beverage and travel. Hospitality industry in this matter regarding as some of the discussions has increased. This technological development is to create the opportunities and advantages of supporting others but it is the beginning of dissociation of human labour from the hospitality industry. This research starts with this controversy, robotic technologies in hospitality within their relationship to interpret and the India's first robotic restaurants with "Robo chef restaurant" in the service area of the visitors Researching Indian Food Freak and OpenTable web sites through which researcher carry out the review for assessments will be done. Exploratory research was conducted to know the effects of robotics in hospitality and related additives to provide original purpose has adopted.

Conceptual Framework

Robot-Robotics Technologies and Hospitality Industry

Technology with the development with robots and robotic technologies in big way floor has however, taken together, artificial intelligence in the development of robotic technology for new dimension winning a lot in the hospitality industry (Yang, Henthorne & George, 2020). In addition,

technological developments have changed the perspective of visitors towards hospitality (Altinay & Arici, 2021).

Robots, certain jobs to make on behalf of CESIT, is working with automated tools with magnetism. Robotics, on the other hand, is the mechanisms that can replace humans (Ironsi, 2021). If we make a definition based on these concepts: Robots are automatic tools created and programmed by a human from various materials to be used in various jobs. Robotics are humanoid robots. Robots and robotic, created a variety of materials, programming and more then human intervention without designated the task instead of capable, movement capable, physically and autonomous smart machines (Murphy, 2019; Oztemel & Gursev, 2020).

Hospitality industry used robotics, for all the physical and social environment through interaction of organs to follow watching full of movement and to perceive speech, etc. to analyse the facial expressions. Robotics, with the definition of humanoid robots, strengthen human robot interaction by imitating humanoid movements (Stock & Nguyen, 2019). The main purpose of robots and robotics is to serve humans (Jeong et al., 2020). Robots and robotic technologies, has micro impact on the hospitality industry and the macro impact on socio-economic effect (Tuomi, Tussyadiah, & Stienmetz, 2020).

Usage Areas in Hospitality Industry

Robots and robotic technologies all in industries where hospitality of the industry in sub- sectors is used as a negative. There are seven sub-sectors of the hospitality industry those are accommodation, food and beverage, shopping, recreation and entertainment, travel and marketing, transportation and other.

Robot and robotic technologies are used in the hospitality industry in accommodation, food and beverage, travel-marketing, transportation, recreation and entertainment sectors.

- *Hospitality Industry:* Pool cleaning robot, lawn mower robot, self-service check-in/check-out kiosks, front desk robot, bellboy robot Sacarino (Rodriguez-Lizundia et al., 2015), cleaning robot Roomba (Liu et al., 2018), room assistant robot.

The presence of these robots and robotic accepted, the manner of use in the hospitality industry of robotic technologies is sufficient to use, for providing good service to the customer (Schulz et al., 2017).

- *Food & Beverage Sector:* Restaurants and cafes waiter welcome, cooks, bartenders Royal Caribbean (2016), conveyor service systems, 3-D food printer Botero-Murphy (2016) and food the (3-D food printer) Natural Machines (2021).

The food and beverage industry processes from preparation to presentation of products can be automated through robots and robotics (Ivanov & Webster, 2017). Thus, the economic burden of the labour factor, which is a great cost for businesses, can be reduced.

- *Hospitality Sector and Marketing:* Robot guide Tawabo, informational kiosks, robotic avatar (disabled bi- to virtual travel opportunities, offering robots Xu, Wong, Tam, Lo & Cheung, 2020).
- *Transportation Industry:* Self-service check-in kiosks at airports, cleaning robot, luggage handling robot, welcome robot, customer service robot.
- *Recreation and Entertainment Industry:* Guide robot, ticket sales kiosks in museums and recreation areas.

Technological adaptation that occurs with the advancement of technology causes many changes. Human-human relations in the hospitality industry are evolving into human-robot relations (Fuste-Forne, 2021).

Advantages and Disadvantages of Robot-Robotic Technologies

The use of robots and robotics in hospitality establishments can have positive and negative effects on visitor satisfaction, as well as positive and negative effects on behavioural intentions (Wasko & Faraj, 2005; Doorn et al., 2017; Christou, Simillidou, & Stylianou, 2020). Robots and use of robotic in hospitality creates the brand positive and negative image (Murphy, Gretzel & Pesonen, 2019).

Advantages

Reduced labour costs, increased work efficiency Christou et al. (2020); Tuomi et al. (2020), Evaluation of the service relationship between human and human, Hjalager (2015), also, robot and robotic technologies can surprise visitors and contribute positively to satisfaction (Ivanov & Webster, 2017). This technology for the creation of new tourist experience, make visitors comfortable in their own language to establish, and thus the visitors' robots across themselves more make comfortable (Pillai & Sivatha, 2020). It can improve the travel and vacation experiences of people with disabilities (Choo

& Kayacan, 2020). In addition, financial planning of enterprises can provide benefits that will facilitate (Mil & Dirican, 2018). Hospitality market will expand influence by taking services of robot, (Evtodieva, Chernova, Ivanova & Protsenko, 2020), as a result of different and new experience that will occur after the use of robots and robotic technology, new niche market out may occur.

Disadvantages

Increase the use of robot in hospitality decrease human labour power requirements by reducing employment, this crate negative impacts in hospitality (Ritzer, 2015). The use of robot and robotic technologies can be a substitute for the human-labour factor. But robots and robotic technologies are not yet able to replace the human factor (Reis, Santo & Melão (2020)). It can create a feeling of dissatisfaction in visitors due to the performance of robots and robotics. Also, the robots and robotic technology arising difficulties occur. Disadvantages of being sourced from new robots and robotic technology the hospitality industry cannot provide sufficient data to set the development, but later in the year more research will be held.

Visitor Comments and Complaints

The use of the Internet has become the norm by improving instant communication between individuals (Cormode & Krishnamurthy, 2008). Thus, individuals with each other, reliable and fast communication by establishing more accurate information - to advanced are available (Yee, Law, GI & Chen, 2011).

Complaints are registered by many visitors, that the expectations cannot be met in the case of robotic services (Falotico et al., 2017). The visits review and complaints must be considered by providing a great importance. Comments and complaints of potential visitors consider value, reliable source of an information (Ye & Gu, 2009).

Business reviews and complaints into account by product development, service quality increase as the activities can be made in a good way and that actions are evaluated in terms of business marketing, promotion, satisfaction, customer relations and so on. Robot and robotic technology reveal advantages in many aspects such as (Sujithamrak & Lam, 2005; Jalkala, Cova, Salle & Salminen, 2010; Eyssel & Kuchenbrandt, 2012). They also review and complain an important brand values and the positive effects. While positive comments increase the demand, brand image and loyalty to the business,

negative comments and complaints negatively affect the brand image, demand and customer loyalty (Bruhn, Schoen Mueller & Schäfer, 2012). At the same time, comments and complaints are also important for sustainable hospitality (Ozen & Guzel, 2021).

OpenTable and Researching Indian Food Freak web sites, becomes reliable information source (Sweeney, Soutar & Mazzarol, 2012). Comments and complaints found on OpenTable and Indian Food Freak websites represent the global dimension of traditional word of mouth, behavioural intention to recommend/not recommend to others. Visitors have begun to share their opinions, suggestions, experiences and complaints through these websites and use them more and more as time goes on (Rezabakhsh, Bornemann, Hansen & Schrader, 2006). Also, these web sites are consumer-producer tool (Barbera et al., 2014). As a result, websites such as OpenTable and Indian food freak fulfil the visitor's needs (Vlahov & Vlahov, 2021: Viglia, Minazzi & Buhalis, 2016).

Methodology

The aim of the research in hospitality industry is to know the effects of robot and robotic technology in sub-sector of hospitality industry. Thus, to make inferences about the future of robots and robotics in hospitality. This study also research and reveals the importance of the information for discussions based on the relationship between technology and hospitality. For the purposes of the research, qualitative research methods were used. The universe determined in this research is the "Robo chef" restaurant, which is a robotic restaurant in India. The reason why Robo chef restaurant was chosen as the research population is that it is the first robotic restaurant in the India. The sample from "Robo chef" restaurant was collected from April 2021 to March 2022. Sample of the research was collected from OpenTable and Indian Food Freak web sites, where visitors fill their feedback form. The ratings given by the visitors who visited at the restaurant and commented on the restaurant are as follows: (10 = Extraordinary, 8 = Very Good, 6 = Good, 4 = Average, 2 = Bad). Average scores of 7.6 was given to Restaurant with the "good = 6 and 8 = very good" degree of staying visitors restaurant from businesses satisfied that they can foresee.

Word of Mouth Behavioural Intention

It is typical case sampling from purposive sampling methods. Purposeful sampling is the selection of the most appropriate sample to address the

problem of the research (Buchmann, 2017). In addition, visitor comments on OpenTable and Indian Food Freak websites were used as the secondary data source of the research. In order to analyse the experiences of visitors staying at the restaurant, visitor comments on OpenTable and Indian Food Freak websites were examined. The Internet is an important fieldwork element to analyse the experiences of visitors Websites such as OpenTable and Indian Food Freak, in research virtual field studies is being used (Mkono, 2012). Content analysis method was used to examine and interpret visitors' comments and complaints in the most effective way in accordance with the purpose of the research (Braun & Clarke, 2006).

On the basis of three themes (performance of robots and robotics, visitors' feelings and experiences and prices paid) visitors experience about the services provided by root was revealed. All comments other than the three identified themes were excluded from the analysis (eg, the physical condition of the Tables or the taste of the food, etc.). The themes created in qualitative research are created with the codes obtained as a result of the data analysed within the framework of the inductive approach. The sample list of codes related to the determined themes is shown in Table 1.

Results

Robo chef restaurant is available for visitor on OpenTable and Indian Food Freak website in all languages, through a website review and complaints (by the date: The old review from the new review right) respectively analysis has been done. Due to its nature, robo chef restaurant is an accommodation business that offers almost all services through robots and robotics technology.

As a result of the data analysis, three themes were revealed: the performance of robots and robotics, visitor feelings and experiences and price performance. Comments and complaints given by visitors, outside of these main themes were not taken into database. For example: The location of the restaurant, food and beverage (tasty/not tasty), condition of the tables and chair (clean, spacious, etc.). Because comments and complaints like these are not related to the services offered by robots and robotics and their performances. In addition, the robot-human relationship and robot-labour of the concept outside of the remaining characteristics are taken for data analysis.

Each of the three main themes identified are explained in detail below. Identified themes robotic restaurants pots were formed to include services and goods offered in the restaurant. It also identified these three themes Aras-

Climb the purposes suitable as visitor comments from and received literature from Tung and Au, 2018.

Review and Complaints done through OpenTable Web Site

Robo chef restaurant in India contained three (3) stars in standard, 245 different visitors made comments about the restaurant on OpenTable. Respondents are from different countries, 119 are from India, 33 from England, 5 From China, 3 from France, 35 from Russia, 14 from Sri Lanka, 11 from Pakistan, 20 from Bangladesh and 5 from different other countries. These comments were translated into English via Google Translate and analysed it Bhimasta and Kuo 2019. The ratings given by the visitors who stayed some time and commented on the restaurant are as follows: (5 = Excellent, 4 = Very Good, 3 = Average, 2 = Bad, 1 = very Bad). Restaurant scores to the average score of 3.46 with "4 = very good and 3 = average" degree of satisfaction of visitors in restaurant from service were seen.

One year after the restaurant opened in 2017, it received the most comments from visitors. Because technology and innovations are a structural factor that arouses interest and curiosity.

The restaurant visitors enjoy the visit in robot base restaurant. Again, in this context, we can interpret that technology is a factor that arouses curiosity and interest for children, and it is a new niche market for families with children.

When we grouped the comments made by the visitors according to languages, it was seen that the most comments were in English with a rate of 72.1%.

Researching Indian Food Freak Web Site Through Done Review and Complaints

A total of 163 visitor reviews in different languages were made on Booking.com for the Robo chef restaurant. Indian Food Freak out reviews by visitors and with OpenTable out reviews are same. Restaurant business in two web sites on the scoring engaged visitors by the same level was found by the reviews.

We can state that families make comments with a rate of 54.6% from the group of visitors who visit the restaurant. Again, as seen on the OpenTable website, it has also been seen on Indian food freak that those who visit and comment on the restaurant are families with this restaurant.

Thematic Analysis Findings

There are thematic analysis findings related to three main themes determined in this part of the research.

Performance of Robots and Robotics

The restaurant is offering different services robots and robotic visitors by perceived performance in multiplier of problems at the beginning of robots and robotics restaurant the functions was failures.

- *Front Office Service Found by Robot and Robotics*

There are problems created by the robots and robotics in the front office in performing the restaurant check-in and check-out procedures. It was also stated that there were problems due to the fact that robots and robotics only spoke and understood English when the restaurant was first opened. It has been stated that the restaurant check-in and check-out processes carried out by robots and robotics take longer than normal. For example: "login jobs take time…".

Again, the inadequacy of the robots and robotics providing service at the front desk against visitor problems and questions were expressed. For example: "robots can't answer questions like a human …", "scanned my passport multiple times and took too much time to enter…", "reception robots are not working as effectively as expected …, "robots can only speak a few sentences …, "although it is a high-performance robot, its role is quite limited".

- *Robots and Robotics Found on Tables*

The main complaints about the assistant robot performance in the Tables are; robot can answer only selected questions which can impairment the performance.

At the same time, the robot tries to respond to the sounds that occur in the environment even when there are no questions from. E.g.; It is "reacting to the sounds coming from the television…" to the voices coming from the television or "reacting to the cry of the child …" to the conversations of the visitors among themselves. Again, the robot functions are insufficient to have feel visitors by complaint and emotion.

- *Market Vending Machines*

The restaurant is located with other robots are vending machines. These automatons people through without emotion gift merchandise sales provide. However, due to the lack of information on the use of vending machines, difficulties have arisen in terms of the use of visitors. For example: "explanations how to use vending machine are missing…".

- *The Robot and the Robotic Their Performance on Positive Comments*

Visitors made a positive review of the findings, which are as following: Robots and robotic performance is sufficient to satisfied the customer, trouble-free and easy to use when visitors are expressing their feeling. For example: "input process was easy ...", "robots that provide services can expected better ...", "robots are considered as simple as it may be, unmanned supermarket vending machines and cleaning robot".

Also, a lot of visitors that have made the following comment refers to: "The front desk at check-in or check-out position robots welcomed visitors in a proper manner. In the cloakroom, the robotic arm will store your luggage for you. Mechanical, but a way of people, with robots you spend is a fun moment for visitors.

Visitor Emotions and Experiences

Visitor experience is both positive as well as negative emotions and experiences covering provides a framework. The following words appeared in the comments expressing the feelings of joy and surprise: Fun (26 expressions) "fun restaurant.", quirky-weird (31 expressions) "weird restaurant…", "interesting restaurant…" and exciting and happy for children, etc. (24 expressions) emotion is experienced the largest percentage of expression were " kids for fun ... (26 expressions) ", " children happy ... ", " children were excited ...". Satisfied visitors from the restaurant to visit again.

Positive experiences, including comments on the main theme of visitor's robots and the robotic interaction to be fun, "the robot system would work properly and family fun are satisfied.

In addition to the unique and interesting experience where they live "interaction with the robot was unique ...", "interesting for first-time, even though this experience to live ought to recommend others. Interacting with

robots makes visitors feel comfortable. E.g.; "robots are good for feeling comfortable in restaurant procedures …".

Price Performance

The restaurant's price performance to be analysed with comments received with visitors are divided into two groups. Price accordance finds (27 responses) "exceptional freshness cheap restaurant ... (16 responses).", "reasonable price ... (28 responses)," "a cheap restaurant. (25 responses) ...", and the price of high-finding (17 responses) Visitors of the review number almost equal level. Price is high by being concerned with that expressed product line is very important (35 responses) "this restaurant is the price worth (33 responses)" and "service price does not meet (34 responses)", "At this price I will not visit this restaurant again. (28 responses).", "high prices for services ... (36 responses)." "the use of robots and robotic due to accommodation costs cheaper should be, but it is not cheap... (44 responses)".

Visitors see the use of robots and robotics as an expression in the literature as a factor reducing costs. Therefore, they expect the restaurant price to be more affordable than other restaurants.

Conclusion and Recommendations

Research through OpenTable and Indian food freak web site over the visitors for robot's restaurant robo chef three main themes was analysed (robots and robotic performance, the visitors' feelings and experiences, and price performance).

This research robots and robotic use in restaurant, a sub-sector in hospitality sector to know the existence of visitors by how they perceived and analyse the work of robot. As a result of these analyses, the findings about the robot and robotic performance by the visitors are the main source of visitor complaints is that robots and robotics cannot show any action other than certain tasks. But it is also noted as currently used robots and robotics machines work with intelligence. Today's technology in robotics having sufficient competence in the hospitality industry against robots and robotic technology sub-structure fully as ready is not. This infrastructure is not ready not only for the supply part but also for the demand part. In particular, feelings and behaviours such as hospitality arising from human-human relations of individuals cannot be provided by robotics yet. At the same time mentioned before as visitors and robots of robots in robotics from the restaurant to the

high expectations of service and the robotic performance is not adequate up to the level of consideration. Again, visitor comments stated that these robots and robotics used in the restaurant should be improved. However, as a result of the analysis of all these comments and complaints, we cannot state that the findings are neither sufficient nor insufficient about the performance of robots and robotics. In line with today's technology robots and robotics in this study also expressed as such as human-labour's substitution and competence.

Some other factors of research are visitors' feelings and experiences for conducted analyses of robotic fun, it was visitors than before such an experience they live for the amount emerges memory and interesting moment which they expressed during restaurant visit. In a way, it can be a good source for promotional tool. Because it creates a great niche market for individuals who are interested in technology, who like to have different experiences, and want to spend fun time with children and family. Yet visitors review and the complaint is understood to Robo chef they're generally satisfied with the restaurant, and recommend to others. But some visitor's disappointed with the performance of robots and robotics origin their expectation levels was high but the services provided to them is not up to their expectation. Again, a visitor stated that they sees robots and robotics only as an eyewash for marketing purposes. These experiences experienced by the visitors will allow them to have an unforgettable positive or negative communication and experience between the robot and the human is unforgettable. As stated in the research findings, it is recommended by the visitors that individuals have this interesting and unforgettable experience.

Robo chef visitors' robotic performance for the price of restaurant reviews and complaints arising from the findings of restaurant prices is available for adequate number of statements could not be made. Robots and about robotic performance the comments of visitors are almost equal in two level, they are divided into poles. However, it is expected by some visitors that the robot restaurant will get rid of a huge cost burden such as personnel and the food prices will be more affordable compared to other restaurants in the destination. This is why conducted analysis on the results cause some visitors to the restaurant say that the price is high.

As a result, the hospitality industry robots and robotic will be the substitution of human labour. However, in the coming years, with the development of technology, the use of robots and robotics will increase. The restaurant is available with robots and robotics in 2017 in only English language, more local language interaction can be inbuild in robot in future.

In terms of contributing to the discussions on the use of robots and robotic technologies in hospitality, which is one of the main questions of the research, the findings of the research clearly showed that the visitors were generally satisfied with the restaurant through the average scores they gave about the restaurant. However, the findings also contribute to two different views. First of all, it has a reducing effect on the human-labour factor in hospitality. In other words, the use of robots and robotics in the hospitality sector has a reducing effect on employment. It also reduces the emotion and behaviour in which visitors received from human.

In addition to the robots and robotics available in the Robo chef restaurant within the framework of today's technological possibilities, in the future, cook robots, bartender robots, waiter robots, etc., both in different departments of the accommodation sectors. we can foresee that their use will increase in all sectors by developing

Last as research limitations and future studies proposals if these are ways: First, research was revealed by analysing data collected by two different service providing websites from a single restaurant. Future studies will come in the years that matter more than the restaurant and travel web site can develop using for the research. In addition, the survey data are taken from two different Web sites for revisit of visitors in robo chef restaurant, the views of visitors are considered for further improvement in the services according to the comments on these websites. Future work on this subject about possibilities within the framework for service improvement of restaurants may obtained by an operation could be improved. Again, future studies can perform a study that analyses the differences between studies using temporal variation.

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Table 1: Themes and Codes

Themes	Codes
Performance of robots and robotics	"Robots cannot give answer of questions like a man" "the role of robot is quite limited, "and" helper robot can give certain answers of questions"
Visitor feelings and experiences	"fun", "interesting", "weird", "exciting"
Price performance	"Price is not available", "reasonable price", "does not meet the price for the service", "robots and robotic service is use because of accommodation costs cheaper"

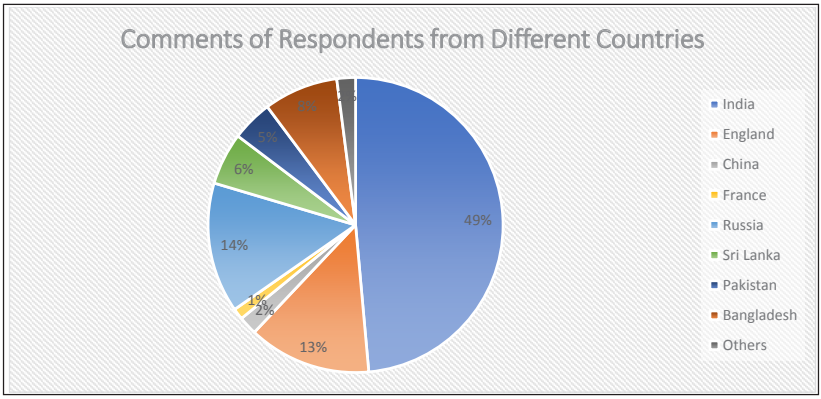

Fig. 1: Visitors Comments

Table 2: Visitor Emotions and Experiences

Visitor Experience	Respondents
Feelings of Joy and surprise	26
Fun Restaurant	31
Exciting and happy for child	24
Satisfied visitors	26

Table 3: Price Performance

Factors	Respondents
Price Accordance	27
Exceptional freshness	16
Reasonable Price	28
Cheap Restaurant	25
High Price	17
Price is high in respect of service	35
Price Worth	33
Service price doesn't meet	34
At this price not visit this restaurant again	28
High price for service	36
Accommodation costs cheaper	44